too have built up a vast edifice of knowledge which they are willing to share with us, and which we greatly need. They too have never lost that longing for the truth about evolution which to men of my date is the salt of biology, the impulse which made us biologists. . . .

The separation between the laboratory men and the systematists already imperils the work, I might almost say the sanity, of both. . . .

I have put before you very frankly the considerations which have made us agnostic as to the actual mode and processes of evolution. When such confessions are made the enemies of science see their chance. . . . Our doubts are not as to the reality or truth of evolution, but as to the origin of *species*, a technical, almost domestic, problem. Any day that mystery may be solved. . . . That synthesis will follow on an analysis, we do not and cannot doubt.

These passages seem to me to do great credit to Professor Bateson in so far as they contain a frank expression of his opinion that up to the present time neither the causes nor the mode of origin of species have been revealed by the older study of Variation, the newer study of Mutation, or the still more modern study of Genetics. If this opinion is generally accepted as a fact or demonstrated truth, the way is open to search the causes of evolution along other lines of inquiry.

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SCIENCE IN THE PHILIPPINES

EVER since returning from the Philippines in 1919, after a four-year stay, I have had in mind the writing of a brief account of conditions as I found them, especially those conditions which are of interest to the research man, who has wondered how the general status of his profession, and working conditions in the tropics compare with conditions in a large city in the northern part of the United States. My own experience in the tropics is limited to Manila and vicinity, but from my reading and from conversation with others I am of the opinion that conditions in the Philippines, Cuba, Panama, India, Java and other places in the tropics are somewhat similar, independent of the longitude. I have purposely delayed setting down my ideas, because I wished to wait until I could have a fair perspective in comparing experiences in the Philippines with experiences in the United States both before and after my stay there.

There are so many advantages and so many disadvantages to be taken into account that it is difficult to say which location is the more satisfactory for scientific work, and of course, the delights and new interests, and the broadening of one's horizon that come about from travel in the Orient are not to be overlooked. I shall mention only a few points to be considered without making any attempt to give them in the order of their importance.

Climatic conditions are unfavorable in so far as their effect on physical and mental efficiency is concerned. The high temperature and high relative humidity have a tendency to cut down productiveness. To accomplish a given result requires much more energy and determination than in a temperate climate. With the thermometer around 95 to 100 degrees Fahrenheit and the relative humidity between 90 and 100 per cent., the average individual is not so keen about performing his daily activities, especially those which require mental effort.

The general slowing up suffered by the average individual coming to the tropics from a temperate climate is so well understood by old Spanish residents of the Philippines that they divide all foreigners into three classes. There are the *Ricien Nacidos*, those who have been in the islands not to exceed two or three years, or literally, the "recently born." The middle class consists of those who have been there for five to ten years, and are beginning to become modified by the environment. The last class is called the *Platinos*, or "bananos." This class is supposed to have eaten so many bananas that they have become sleepy and torpid, have lost much of the industry of a temperate climate and have settled down and become a part of the general scheme of life in the tropics.

The separation from scientific societies and the opportunity to discuss problems and compare notes with others of the same profession

must be admitted is a serious disadvantage. The range of acquaintanceship with persons engaged in his own class of work is limited and while there are a few science organizations these are small in comparison with those that can be enjoyed in an American city. The result is that, although one often spends more time in reading books and journal articles than if he were here, he finds on his return that a number of things of importance have transpired in the science world of which he either did not hear, or which failed to make much of an impression on him.

Work is often retarded by failing to get supplies promptly. It so happened that during my stay in the Philippines this condition prevailed all over the world, but it was worse there and is more or less chronic. If supplies are ordered from the United States, they cannot be expected in less than three months. To receive them in such a short time means that the stock was on hand at the supply house when the order was received and that there was no delay in filling the order. The time may be shortened, of course, by sending a cablegram, but unless definite arrangements are made and a special code established, this procedure is not practicable in general. With the cable rate from Manila to New York more than a dollar a word it may be seen that cable messages are justifiable only in rather unusual circumstances. If the order, when it arrives in Chicago or New York, is not filled with care and dispatch, another month or two may elapse. Usually it is not safe to count on delivery of goods in less than six months. It frequently happens that the manufacturer or dealer in America does not realize how long a time is required for an exchange of correspondence and will write requesting some further information, which means a delay of another three months, and so on.

On one occasion I ordered a pyrometer from a well known manufacturer in the United States. The order was sent by mail, but marked rush, and we hoped to receive the instrument within three or four months. At the end of that time, a letter was received, asking whether the wall type or table type of galvanometer was preferred. This was answered at once, stating that the table type was preferable. Several months later another letter came, this time asking whether we desired the scale to be graduated in Fahrenheit or Centigrade. By this time our work had been held up so long and we were so disgusted by the long delay that we at once cabled him to send the Centigrade scale. Practically a year from the date of the original order, the instrument arrived. Possibly a little profanity was justifiable when on unpacking the pyrometer, it was found that he had sent the Fahrenheit scale. Of course, this is an extreme case, but serves to illustrate the serious disadvantage of being separated by 10,000 miles from a supply house where a large stock of chemicals and apparatus may be obtained immediately. In Manila, as a rule, such materials are handled by drug stores and the limited stocks which they carry are available only to tide over until regular orders can be placed. Usually the chemicals in stock are primarily for pharmaceutical purposes, and not many chemically pure reagents are to be had.

Such compounds as ferrous salts seem to become oxidized much more rapidly than here; although I have seen no actual data to that effect. Also a number of compounds which do not take up moisture rapidly in a dry climate, do so there. On one occasion I bought an ounce or two of sodium thiosulphate for some photographic work. After completing the work, I left the remainder of the chemical in its original container which happened to be a paper bag and placed it in a drawer of the library table. On pulling out the drawer a few days later I was surprised to find considerable water which had wet a number of articles in the drawer. On looking for the source I found that the chemical was saturated with water and that it was necessary to keep it in a tight container. Chemicals for use in the tropics should be ordered in small containers so that if a portion is removed and the remainder is allowed to stand for a time, the loss will not be great. Although the cost of chemicals in quarter-pound bottles is slightly higher than in pound bottles, the saving and satisfaction more than repay the extra cost.

The deterioration of instruments and appara-

tus is especially troublesome. Almost any metal except gold or platinum will corrode rapidly if given half a chance. A number of experiences soon bring this to the attention of a new arrival in the islands. Wire paper fasteners must be made of brass if it is desired to keep pamphlets and magazines in good condition. After a short time, ordinary iron wire fasteners corrode to such an extent that the paper in contact with them is discolored from iron rust. Ordinary iron wire paper clips rust so rapidly that after a year or two they cannot be removed without being bent out of shape. The frames of cameras made of metal covered with leather go to pieces in some cases. The alloy becomes oxidized and pushes off the leather cover. Of course, it is an easy matter to remove the covering of oxide and replace the leather, but in a short time, more moisture has been absorbed and corrosion has taken place a second time.

These are trivial things compared with what happens to delicate physical apparatus of all kinds. It seems almost impossible to protect instruments from atmospheric moisture to such an extent that corrosion does not begin, and if this continues long enough the piece of apparatus is worthless. In many cases the corrosion does not justify replacement, but does demand restandardization. In order to get satisfactory results with pyrometers, galvanometers and the like it is necessary to restandardize them frequently, and this requires considerable time. Too long a time would be required to return the apparatus to the manufacturers for repairs and restandardization. Even glass lenses of microscopes, telescopes, cameras and the like are not immune. If they are not used for a time, they become spotted, and often have to be repolished.

Reliable skilled assistants are difficult to obtain. The demand for them is somewhat limited and every position is filled. However, there does not seem to be a position vacant nor a man out of employment. Most of the positions are filled by Europeans or Americans, though there is an ever increasing body of Filipinos trained in science. The difficulty is that there is very little flexibility to the system. If one man returns to the States or leaves his regular position for any reason, it is almost impossible to replace him without a long delay of correspondence back and forth to the United States and during this time, it often happens that valuable pieces of research are held up and interest is lost in them, because no one can be found to carry on the work.

Thus far I have mentioned only the tribulations of scientists in the tropics and I wish to protest against any charge of exaggeration. The account is not overdrawn and all of the items mentioned have come under my personal observation, and I believe anyone who has had experience in the tropics will verify them. However, there is another side, as I have previously mentioned. In this connection, the first thing which I shall discuss is the great interest and fascination of the various research problems which one encounters in the Philippines. The field is comparatively new and if one has some idea or plan for research, the chances are that on investigation, he will not find that it has been trampled over, but that he has practically a carte blanche. Although extensive research has been carried on at the Bureau of Science and elsewhere for the past decade or two, nevertheless the vast number of problems waiting to be solved have scarcely been touched.

While skilled assistants are few and difficult to obtain, unskilled help is plentiful. Filipinos are adapted physically to careful manipulation and some of them are very satisfactory indeed. The salary for such a position is much lower than here and a number of helpers are often available,—which greatly expedites the work. The climatic conditions make the average American irritable and perhaps unusually hard to please, and while he is in the islands he is likely to believe that his unskilled assistants possess little merit and are difficult to direct, but when he looks back at his experiences, he is likely to change his mind materially and wish he could have half a dozen *muchachos* in his laboratory in the States.

Generally the laboratory is in a building of only one or two stories. This is very satisfactory because there is much less danger from fires and accidents. The uniform temperature greatly adds to the flexibility of the laboratory.

If the train of apparatus to be set up is too long for the room available, some of it may be put outside the laboratory. There is no question of cold and heat to be taken into account and during most of the year all that is needed is protection from the sun. There is always the advantage of good light and air and freedom from soot and dirt. Laboratory work is practically out-of-door work. There is no heating system, and no frozen pipes to be dreaded.

J. C. WITT

CHICAGO, SEPTEMBER 10, 1921

CHARLES HENRY DAVIS 2ND

CHARLES HENRY DAVIS 2ND, Rear Admiral, retired, U. S. Navy, who was twice Superintendent of the Naval Observatory, died at Washington, D. C., December 27, 1921.

He was born in Cambridge, Mass., August 28, 1845, the son of Charles Henry Davis and Harriette Blake Mills.

Admiral Davis graduated from the Naval Academy in 1864. From 1875 till 1885 he was engaged principally in astronomical work, at first in the Naval Observatory at Washington, in the Department of Chronometers, and then in expeditions for the determination of longitudes by means of the submarine cables. Also, the latitudes of many stations were determined by Talcott's Method.

In No. 6, Navy Scientific Papers, published by the Bureau of Navigation, are given the investigations by Davis of Chronometer Rates as affected by Temperature and other Causes. The results of the longitude expeditions are presented in three publications of the Navy Hydrographic Office: with Lieutenant-Commander Francis M. Green and Lieutenant J. A. Norris "Telegraphic Determination of Longitudes, embracing the Meridians of Lisbon, Madeira, Porto Grande, Para, Pernambuco, Bahia, Rio de Janeiro, Montevideo, and Buenos Aires, with the latitudes of the Several Stations"; also with Lieutenant-Commander Green, and Lieutenant Norris, "Telegraphic Determination of Longitudes in Japan, China, and the East Indies, embracing the meridians of Yokohama, Nagasaki, Vladivostok, Shanghai, Amoy, Hong-Kong, Manila, Cape St. James, Singapore, Batavia, and Madras, with the latitude of the several Stations"; with Lieutenants Nornis and Laird, "Telegraphic Determination of Longitudes in Mexico and Central America and on the West Coast of South America, embracing the meridians of Vera Cruz, Guatemala, La Libertad, Paita, Lima, Anca, Valparaiso, and the Argentine National Observatory at Cordoba, with the Latitudes of the Several Sea-Coast Stations."

Davis as a Captain was Superintendent of the Naval Observatory from July, 1897, to April, 1898, leaving the Observatory to command the Dixie in the Spanish War. He returned to the Observatory in November, 1898, and remained on duty there as Superintendent until November, 1902. As Superintendent, Captain Davis took an active and successful part in the completion of the equipment of the New Naval Observatory and in formulating plans for the work to be carried on.

In 1904 Davis was made a Rear Admiral, and in 1904 and 1905 he was the U. S. representative on the international commission of inquiry on the North Sea incident which sat in Paris.

After service at sea as Squadron Commander, Admiral Davis was retired August 28, 1907. He continued to be interested in astronomy after his retirement, by reason of his achievements in science and because of his long service at the Naval Observatory.

His father, also a Rear Admiral, had twice been Superintendent of the Observatory and had established the Nautical Almanac Office.

SCIENTIFIC EVENTS

BRITISH SCIENTIFIC INSTRUMENTS[1]

THE exhibition of British scientific instruments held under the auspices of the Physical Society and the Optical Society at the Imperial College of Science and Technology, of which a description was given in our columns last week, is a timely reminder of the importance of scientific instruments in the national economy. Modern civilization is based, and must be increasingly dependent, on the extension of

[1] From Nature.